

# Thinking Like A Scientist

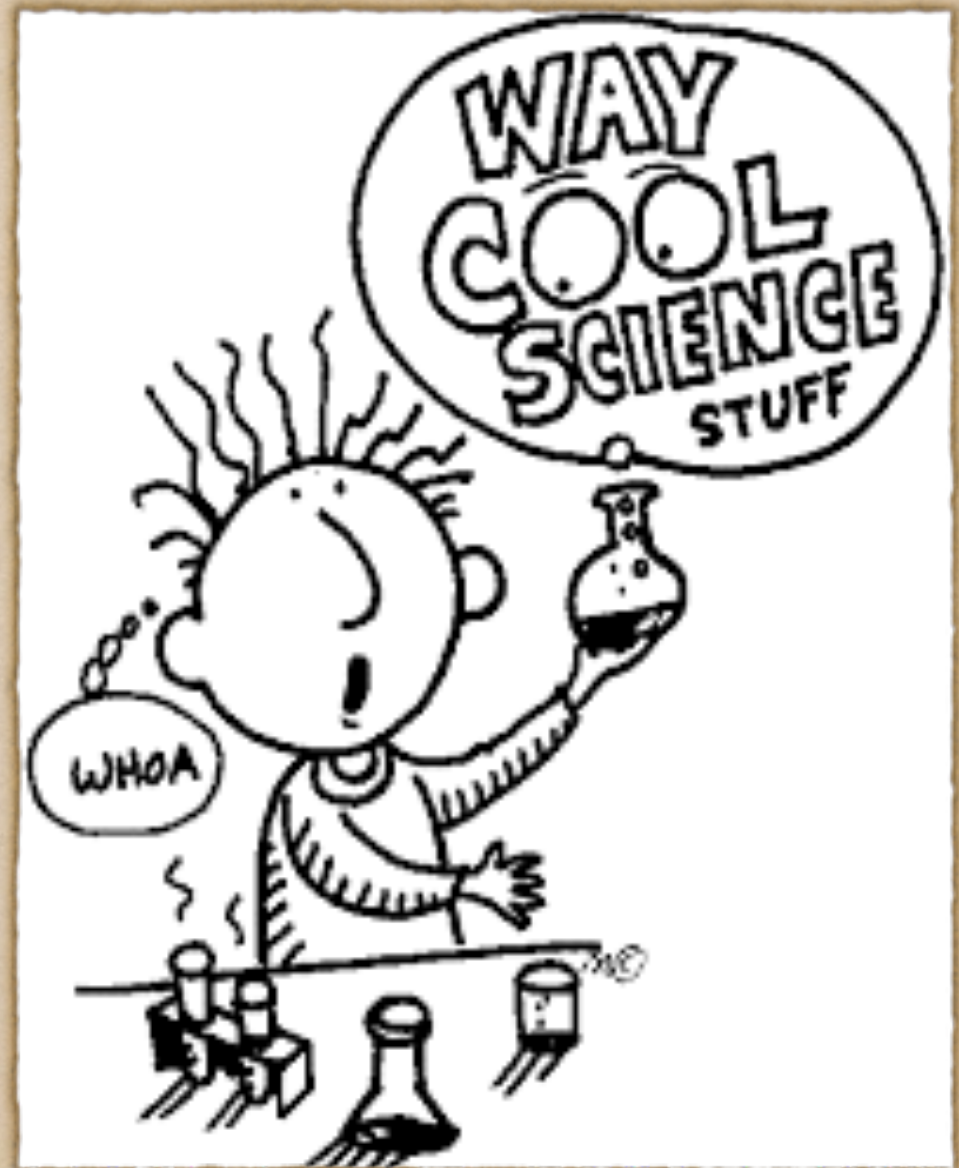
Introduction to Scientific Inquiry



# Important Skills

The skills that all scientists need to be successful are observation, inferring, predicting, classifying, and making models.

Scientists also need to have a particular attitude to be successful. They need to be curious, honest, creative, and open minded.





# Observation



There are two types of observation used in Science: Qualitative & Quantitative.

**Qualitative observation** is where you observe something using all 5 senses. There is no concern for amount or numbers.



**Quantitative observation** is where you observe the amount of items you are observing.



# Inferring

**Inferring** means to arrive to a conclusion by reasoning and evidence. In other words, you are explaining what you are observing and using logic to decide what you think about it.

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Inferring is a very important skill for science as it let's us know how you are thinking about what you are observing.





# Predicting



**Predicting** means to say what you think will happen based on prior knowledge.

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You can infer what you observe, and then predict what you think will happen next.



# Classifying

**Classifying** is a way of grouping things that are similar in some way. There are many ways to classify similar objects.

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You can choose to classify things by the way they move, how they eat, what they eat, or even where they live.





# Making Models



Scientists make models of what they want to explore.

Sometimes things are too big or too small for observations to occur.

For example, if a scientist wants to study the velocity of a Tsunami, they might make a wave pool that will simulate one to study it.



# Review

What are skills that all scientists need to be successful?





# The Scientific Method

**Scientific inquiry** is what you know as the scientific method. It is how scientists discover and explore the world and the universe. The steps involved are very simple.

Keep in mind that the steps involved in the scientific method are not a series, but a cycle that can begin and end anywhere along the cycle.





# The Steps to the Scientific Method

## Posing Questions

Asking questions and being curious is how all scientists get started.

## Background Research

You can't find any answers until you know something about the topic you are questioning. All good scientists research about the topic they want to explore.



## Developing a Hypothesis

A **hypothesis** is a possible explanation to observations and questions asked. It is not an educated guess. It usually is used to give a possible answer to the question posed. It is a possible theory or a possible outcome that is expected when something is going to be done.

You write a hypothesis this way: If I do this, then this will happen. For example, If I drop a ball, then it will bounce. The more specific your hypothesis is, the more reliable and the better it is.

## Designing an Experiment

Experiments are activities used to test a hypothesis which will answer the questions posed originally. An experiment has to be designed using a step-by-step process. It should be clear enough that if another scientist wanted to try it, they could do so without any problems.



## Collecting & Interpreting Data

As you conduct your experiment, you will need to take accurate notes to help you remember what happened. You should also draw pictures, create diagrams and add any other important notes that will help someone else understand what you observed and inferred.

A scientist will then need to interpret the data to help them understand whether the hypothesis is correct or not. It is usually very clear whether the scientist will agree with the hypothesis or not.

## Drawing Conclusions

This step usually happens immediately after the scientist interprets the data. It is the moment when one decides if the hypothesis is correct or not.



## Communicating

Communicating your data and your research are very important for two reasons. The first is to share what you have found with others. The second is to allow others to do what you have done and to see if they find the same thing. If no one else can do what you did, it is considered inconclusive.

## Review

What are the steps to the Scientific Inquiry?





# Laws Vs. Theories

A **scientific law** or scientific principle is a concise verbal or mathematical statement of a relation that is always applied under the same conditions

A **theory** that explains scientific observations; "scientific theories must be falsifiable"





# Keywords

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English - Spanish

Quantitative - Cuantitativo

Qualitative - Cualitativo

Infer - Inferir

Predict - Predecir

Classify - Clasificar

Hypothesis - Hipótesis

Scientific Law - Ley de la Ciencia

Scientific Theory - Teoría Científica